

## **R E M A R K S**

The office action of 04-22-2004 has been reviewed and its contents carefully noted. Reconsideration of this case, as amended, is requested. Claims 1 through 10 remain in this case, with claims 9 and 10 being newly added.

### **Preliminary Comments**

The numbered paragraphs below correspond to the numbered paragraphs in the Office Action.

a. Claim 3 is objected to because of the following informalities: Page 19, claim 3, first word of the claim, "the" should read --The--.

Applicant thanks the Examiner for point out the mistake. Appropriate correction has been done.

b. The drawing, specifically Figures 1 and 2 were now designated by the legend --Prior Art--

A proposed drawing correction is included herewith in reply to the instant Office action to avoid abandonment of the application.

c. claims 9 and 10 are newly added, the support of which are found in Fig. 5 and its concomitant description in the specification section of the instant patent application. No new matter is added.

### **Rejection(s) under 35 U.S.C. §103**

6. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Borraccia et al. (U.S. Patent 6,405,696) in view of Klaar (U.S. Patent 5,992,265) or Arnold et al. (U.S. Patent 4,922,785).

Borraccia teaches an improved splined cam phaser that includes four assemblies: a sprocket assembly, an inner hub assembly, a cover assembly, and a piston assembly. The

**joined assemblies** provide phaser function at reduced manufacturing cost. The component parts of the assemblies are re-configured from analogous parts in the prior art cam phaser to permit much of the improved phaser to be **manufactured inexpensively by powdered metal forming** or by *stamping or drawing* from sheet metal, in contrast with the prior art phaser wherein all parts are *formed expensively* either by machining from forged blanks or by investment casting. These changes reduce not only the cost of manufacture **but also** reduce the *weight and axial length* of the phaser, an important customer acceptance criterion, and improve the speed of response. Further, the proportions of some parts are altered such that all radial and axial loads are borne by a single large bearing in place of two small sequential bearings in the prior art phaser, thus reducing variability in axial alignment of the component parts. (Emphasis added)

As admitted by the Examiner, which in the instant office action as follows:

Borraccia teaches a **spline-type** cam phaser comprising:

- an inner hub 130 and hub flange 132 with oversized bore 142 sized to receive in interference fit a boss 154 on the inner hub 130 for sealably mating with the end of camshaft 12 (column 5, lines 52-67);
- a bolt 76 threaded through the central openings in the camshaft, cover, hub, and hub flange to lock elements irreversibly in a fixed relation with no other radial fastening members (column 5, lines 39-41 and Figures 2, 5, and 6);
- the inner hub 130 preferably formed by machining and press-fitted with hub flange 132 (column 6, lines 9-17); external right hand helical splines 90 and internal left hand helical splines 92 for meshingly engaging the corresponding splines 28, 52 on the sprocket flange and hub assembly, respectively (column 7, lines 38-41);
- eliminating the need for a second load bearing surface reducing component parts and improving axial alignment (column 8, lines 35-41);
- a cover 66 with reduced size, mass and inertia (column 8, lines 54-63);
- a pressed inner groove ring 160 for supporting seal 162 into inner hub 130 permitting easy machining of hub splines 52 and reducing the minimum axial length of the phaser (column 8, lines 64-67 with column 9, lines 1-5). (Emphasis added)

The Examiner, in the immediate above statement, describes a spline type cam phaser. The limitations to the Borraccia spline type phaser is NOT claimed by the instant invention. Whereas, on the other hand, the instant invention claims a phaser, in which “the phaser having a rotor formed as part of the shaft, wherein the shaft is an extension of the rotor”.

Claim 1, recites:

1. In a VCT system having a phaser coupled to a shaft, which can be a driving or driven shaft, an apparatus comprising:

the phaser having a rotor formed as part of the shaft, wherein the shaft is an extension of the rotor, free of any region having openings for accommodating independent fastening members, thereby the axial and radial dimension of the apparatus is reduced.

The difference between a vane type phaser and a spline type phaser is obviously documented in numerous publication including the admission by the Examiner in the instant Office Action. Further, to **irreversibly connect** the hub to a shaft of a spline type phaser defeats the purpose to the spline type phaser.

Moreover, the Examiner has admitted that Borraccia does NOT teach or fail to disclose irreversibly mounting the hub or **rotor** on a shaft without the use of a fastening member. Note that the claimed rotor of the present invention is NOT the equivalent of a 'hub' in the splined phaser.

With regard to the other citations by the instant Office Action, a rotor for a phaser is NOT taught or suggested. Therefore, the citations by the instant Office Action of the phaser having a rotor **irreversibly** connected to one end of the shaft free of any region having openings for accommodating independent fastening members is also NOT taught or suggested.

Therefore, the rejection of claim 1 is deemed overcome. Reconsideration of drawing the rejection is respectfully requested. With regard to claim 5, a means plus function is claimed, following the same line of argument as that of claim 1, the rejection thereto is deemed overcome. Similarly the rejection of method claim 6 is deemed overcome.

Claims 5 and 6 are amended respectively as follows:

5. In a VCT system having a phaser coupled to a shaft, which can be a driving or driven shaft, an apparatus comprising:

a means for forming the shaft as part of a rotor of the phaser ~~to~~-free of any region having openings for accommodating independent fastening members, thereby the axial and radial dimension of the apparatus is reduced.

6. A method for coupling part of a VCT device to a shaft, comprising the steps of:

providing a phaser having a rotor rotating in relation to an opposite part of the phaser, wherein the phaser is axially reduced by eliminating at least one part of the phaser; and

integrally from the shaft as part of the rotor.

The argument stated above, relating to claim 1, is hereby incorporated and repeated herein by reference.

With regard to dependent claims 2-4, and 7-8, by virtue of their dependency are deemed patentable as well. Moreover, with regard to dependent claims 3 and 7, no swaging action is seen to be taught or suggested by the 3 patents cited by the Examiner.

Additionally, in comparing citations to the claimed invention, the claim limitations of the presently claimed invention may not be ignored in an obviousness determination.

Specifically, in claims 3, 5, and 7 as recited below:

3. The apparatus of claim 1, wherein the rotor is irreversibly connected to one end of the shaft by pressing the rotor onto a straight hub; pressing the rotor onto a hub using a straight spline on an inside surface of the rotor and a helical spline on a corresponding surface of the shaft or vice versa; brazing the rotor onto the shaft; **swaging the rotor onto the shaft**; or ballizing the rotor onto the shaft where the shaft is a hollow component. (Emphasis added)

7. The method of claim 6, wherein the rotor is irreversibly connected to one end of the shaft by pressing the rotor onto a straight hub; pressing the rotor onto a hub using a straight spline on an

inside surface of the rotor and a helical spline on a corresponding surface of the shaft or vice versa; brazing the rotor onto the shaft; **swaging** the rotor onto the shaft; or ballizing the rotor onto the shaft where the shaft is a hollow component. (Emphasis added)

Further, in claim 5, the “means for ...” necessity includes swaging.

5. In a VCT system having a phaser coupled to a shaft, which can be a driving or driven shaft, an apparatus comprising:

a **means for** irreversibly connecting a rotor of the phaser to one end of the shaft free of any region having openings for accommodating independent fastening members, thereby the axial and radial dimension of the apparatus is reduced.

Such emphasized features are not taught or suggested by Borraccia et al. (U.S. Patent 6,405,696) in view of Klaar (U.S. Patent 5,992,265) or Arnold et al. (U.S. Patent 4,922,785). Therefore, claims 3, 5, and 7 are not obvious in view of the above.

Furthermore, with regard to dependent claims 4 and 8, that recites respectively as follows:

4. The apparatus of claim 1, wherein the rotor is **machined as part of the shaft**. (Emphasis added)

8. The method of claim 6, wherein the rotor is **machined as part of the shaft**. (Emphasis added)

Nowhere in Borraccia et al. Klaar, or Arnold et al. is the apparatus, wherein the rotor is machined as part of the shaft, taught or suggested. In comparing citations to the claimed invention, the claim limitations of the presently claimed invention may not be ignored in an obviousness determination.

Therefore, applicant respectfully submits that the Examiner has failed to present a prima facie case of obviousness with regard to claims 4 and 8.

Furthermore, the combination of Borraccia et al. (U.S. Patent 6,405,696) in view of Klaar (U.S. Patent 5,992,265) or Arnold et al. (U.S. Patent 4,922,785) would result in an improved spline-type phaser having one of its hub portions irreversibly connected to a shaft which obviously defeat the purpose of the improved spline-type phaser. In such a case the combination would NOT teach or suggest Applicant's phaser having a rotor formed as part of the shaft, wherein the shaft is an extension of the rotor, free of any region having openings for accommodating independent fastening members, thereby the axial and radial dimension of the apparatus is reduced.

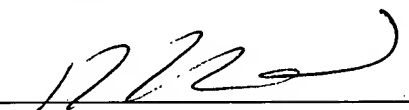
Reconsideration and withdrawal of the rejection are respectfully requested.

### **Conclusion**

Applicant believes the claims, as amended, are patentable over the prior art, and that this case is now in condition for allowance of all claims therein. Such action is thus respectfully requested. If the Examiner disagrees, or believes for any other reason that direct contact with Applicants' attorney would advance the prosecution of the case to finality, he is invited to telephone the undersigned at the number given below.

"Recognizing that Internet communications are not secured, I hereby authorize the PTO to communicate with me concerning any subject matter of this application by electronic mail. I understand that a copy of these communications will be made of record in the application file."

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